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Cloud Computing's Big Debt to NASA **10**

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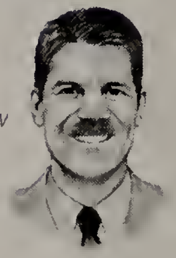

Patrick Neeley
Chief Business Officer, Chickasaw Nation Division of Commerce

Combining big data with company data paints a better picture of the customer.

80% *of the data currently produced is unstructured—coming from sources like images, videos, tweets, posts and e-mails.*

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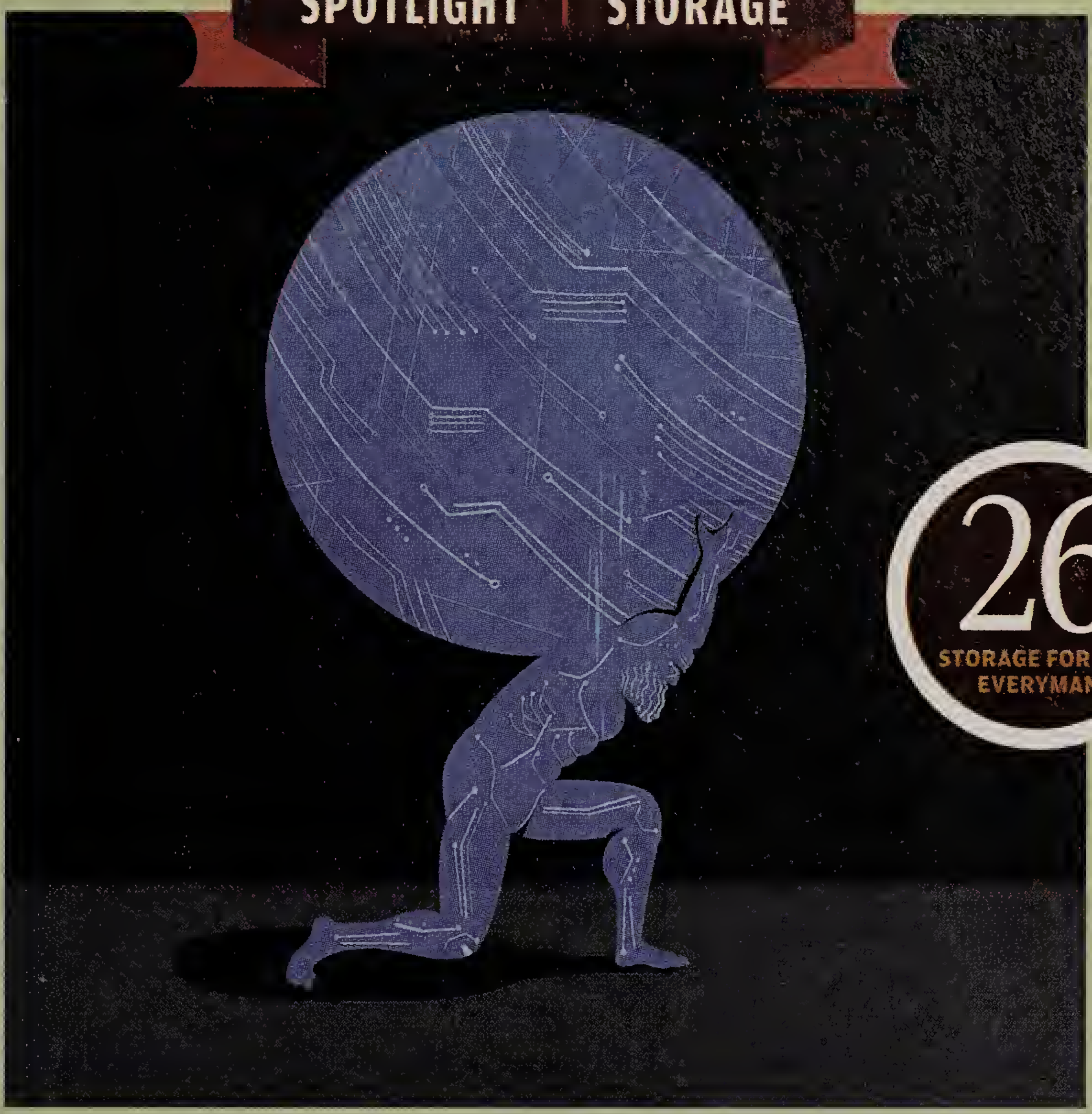
SPOTLIGHT | STORAGE



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HeadsUp

Boston relies on crowdsourcing via a smartphone app to monitor the condition of road surfaces.

PHOTO BY ISTOCK

GOVERNMENT IT

Emerging Tech Keeps Cities Running

IN BOSTON, residents are using city-provided apps to improve municipal operations, that city's CIO, Bill Oates, told attendees of a recent IBM conference in Las Vegas. And one of the city's newest mobile apps, Street Bump, piqued the interest of one of Oates' fellow pubic servants, Gary Gilot, an engineer who heads the public works board in South Bend, Ind.

Street Bump uses a smartphone's accelerometer to record road conditions and then sends the data to the city. It has already helped utilities do a better job of keeping the tops of manhole covers even with the surfaces of roads, Oates said.

The app is part of Boston's Citizens Connect system, which allows residents to report problems such as trash, broken streetlights or graffiti to city officials.

Now going on Version 4.0, the Citizens Connect program is set to be deployed statewide, initially in more than 50 communities.

Gilot said he was impressed by Street Bump's use of crowdsourcing as a way to amass data about road conditions. "I love the idea of the future — that you can avoid the expense by crowdsourcing," he said.

South Bend has taken some low-tech approaches to that problem. It once had city supervisors drive every street in town to rate road conditions.

However, South Bend has gone high tech in other areas. The city worked with IBM to create a wireless sensor network that detects changes in sewer flow and alerts the city to problems. The system has reduced overflows and backups, Gilot said.

– Patrick Thibodeau

IT CAREERS

Computer Science Enrollments Rise 29% in 2011-12

The number of new undergraduate computer science majors at Ph.D.-granting U.S. universities rose by more than 29% last year, an increase that the Computing Research Association called "astonishing."

It was the fifth straight year in which the number of students enrolled in computer-related degree programs increased, according to the CRA's annual Taulbee Survey of computer science, computer engineering or information departments at Ph.D.-granting institutions.

The 2011-12 academic year also marked the third straight year in which the percentage increase in bachelor's degrees awarded in computer science hit double digits. In U.S. computer science departments, the year-over-year increases were 19.8% overall and 16.6% among those departments that participated in the survey this year and last year, according to the CRA.

Computer science enrollment trends "are somewhat cyclical based on the perceived strength of the IT sector," said Peter Harsha, the CRA's director of government affairs.

He noted that CRA members have speculated that the recent upward trend is due in part to the fact that "students are much more aware of the importance of computational thinking in just about every other field of science and technology."

– PATRICK THIBODEAU

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BETWEEN THE LINES

By John Klossner

"THE QUESTION ISN'T WHY AREN'T MORE WOMEN IN I.T.– THE QUESTION IS WHY WOULD ANY WOMAN WANT TO BE IN I.T.?"

DATA CENTER

eBay Develops Metric for Data Centers

THERE'S A MAXIM in the data center business that holds that you can't manage what you can't measure, and eBay has come up with a new metric designed to make it easier to measure — and therefore manage — data center performance.

The online auction service looks at the cost of IT operations in dollars, kilowatt hours and carbon emissions, and then ties those costs back to a single performance metric — the number of transactions its customers conduct on its website.

The result is a "miles per gallon" type of metric that eBay can strive to improve over time, said Dean Nelson, head of eBay's Global Foundation Services unit, which manages the company's data centers worldwide.

"EBay is a single system; it's the sum of a million parts, and we needed a way to measure and convey the efficiency of this system," he said at a recent conference hosted by the Green Grid Forum.

EBay published the methodology for calculating the metric, called Digital Service Efficiency, in hopes that other companies will adopt it — much as the industry rallied around Power Usage Effectiveness, or PUE, as a measure of data center efficiency.

In the process of sharing its methodology, eBay took the unusual step of releasing a wealth of information about its data center operations. For example, the company revealed that it had 52,075 physical servers at the end of 2012 and generated 740 metric tons of carbon per million users, or 1.6 tons per server.

EBay set a target of reducing its cost per transaction and carbon emissions per transaction by 10% this year, and it wants to increase its transactions per kilowatt hour by the same amount, Nelson said.

It may not be easy for other companies to replicate eBay's methodology because other organizations' business models may be more complex than a straightforward count of the number of transactions that customers make.

– James Niccolai, IDG News service

Micro Burst

WEB SERVICES

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500,000

new users in the 48 hours after Google announced the imminent demise of its RSS service, Reader.

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MOBILE DEVICES

Efficiency on the Rise as BYOD Expands at Intel

Intel says its rapidly expanding bring-your-own-device program has been a resounding success that delivered about 5 million hours of productivity gains last year.

In the company's annual IT report released earlier this month, CIO Kim Stevenson credited the BYOD program with saving each employee about 57 minutes per workday.

Over the past year, the company has expanded the number of devices and cloud services supported in the BYOD program.

According to the report, Intel was supporting more than 23,500 employee-owned smartphones and other mobile devices through its BYOD program by the end of last year, an increase of 38% from 2011. The company was also supporting 41 mobile applications at the end of last year, having added 16 approved applications to the BYOD program.

As part of the program, Intel has built a private cloud that gives employees access to company services and information through their personal mobile devices. The cloud model allows Intel to support a range of devices, with access provided based on a device's location, preferences and capabilities, Stevenson said in the report.

– AGAM SHAH,
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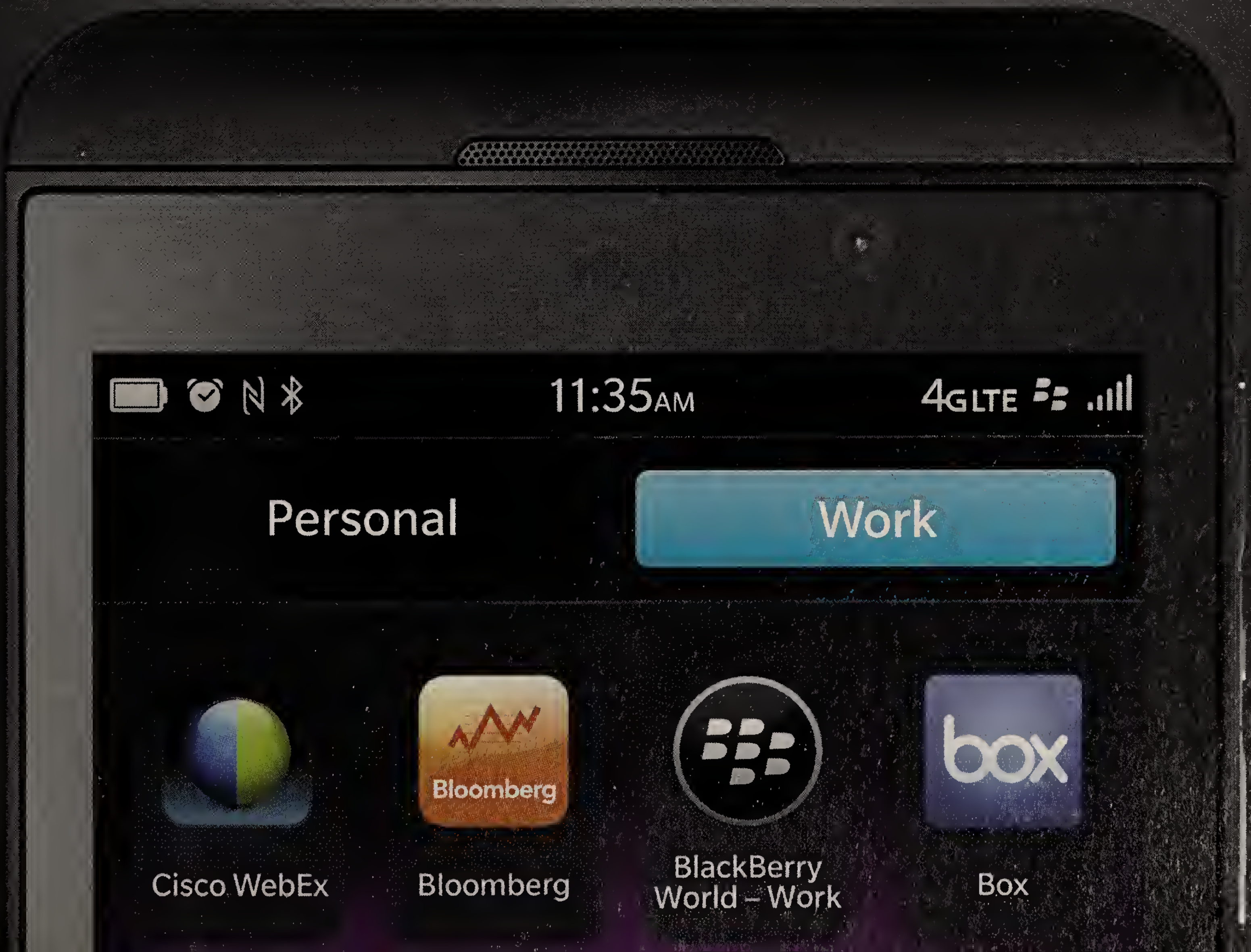

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Sheryl Sandberg contends that the women's movement has "stalled" and "men still run the world."

Book Stirs Debate On Women in IT

Facebook's COO helps draw attention to the continuing decline in the number of female tech workers in the U.S.

By Patrick Thibodeau

FACEBOOK COO Sheryl Sandberg's belief that the women's revolution has "stalled" and that "men still run the world" may have merit, at least in IT.

Women today are clearly rejecting IT as a career.

In the early 1980s, women accounted for just over 37% of all U.S. college students earning bachelor's degrees in computer science. By 2010, that percentage had fallen to a little more than 17%, according to latest available data from the National Science Foundation.

Sandberg is calling on women to be more assertive, or to "lean in," as she writes in her book, *Lean In: Women, Work, and the Will to Lead*. The book comes out at a time when women are significantly under-represented in U.S. data centers.

Last year, women held only 26% of the jobs in computer-related occupations, up from 25% from 2011. That slight uptick notwithstanding, the overall number of female IT professionals has declined steadily since 2000, when women's share of the computer-related jobs pool hit a peak of nearly 30%, according to the National Center for Women & Information Technology (NCWIT).

Tammi Pirri, vice president of human resources at Black Duck Software, an open-source software services and development firm, has witnessed the downward trend first hand. In her eight years at Black Duck, she said, "we've only had one female engineering intern [but] we've had 10 male engineering interns."

Sandberg's book has been criticized for its focus on "changing the women rather than changing the system," said Jenny Slade, communications director at NCWIT. "But frankly, if she'd written a polemic on institutional bias in the workplace, she'd have been criticized for painting women as victims."

Kim Stevenson, vice president and CIO at Intel, one of 24 female CIOs in Fortune 100 companies, said her company's success in increasing the number of female employees in mid- to senior-level technical jobs since 2004 isn't a fluke. Stevenson noted that Intel offers mentoring programs and opportunities for network-building for women — activities that Sandberg champions. The Women at Intel Network has 22 chapters.

Stevenson doesn't share Sandberg's view that progress for women has stalled, though she agrees that more can be done.

Kathy Harris, managing director of Harris Allied, an executive recruiting firm specializing in technology, suggested that women in IT create professional support networks.

"In pure technology departments, men still outnumber women by as much as nine to one. The sole woman in a predominantly male team often feels a sense of isolation," she said.

Karie Willyerd, vice president of learning and social adoption at SAP, said that unflattering stereotypes, like the depictions of engineers in the popular comic strip *Dilbert*, may have discouraged young girls from thinking about IT careers. But recent moves by building block maker Lego and other companies to create products aimed at exposing young girls to engineering could begin to change the cultural message, she added.

Paula Hunter, executive director of the nonprofit Outercurve Foundation, which offers a forum for open-source and commercial software developers to come together, also cited some advantages that can make tech work attractive to more women. Software engineering, she said, "is not only well paid, but highly flexible," and therefore, she added, it's a good profession for "women who want to work throughout their children's formative years." ◆

> "In pure technology departments, **men still outnumber women** by as much as nine to one."
>
> — **KATHY HARRIS,** MANAGING DIRECTOR, HARRIS ALLIED

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[1] Based on IBM testing and documented in IBM System x® Virtualization Server Consolidation sizing methodology. IBM Flex System x240 supports 2.7X more Peak Utilization Virtual Machines (VMs) than previous generation BladeCenter® HS22V.

[2] Based on IDC white paper "The Economics of Virtualization: Moving Toward an Application-Based Cost Model," Michelle Bailey, November 2009, http://www.vmware.com/files/pdf/Virtualization-application-based-cost-model-WP-EN.pdf

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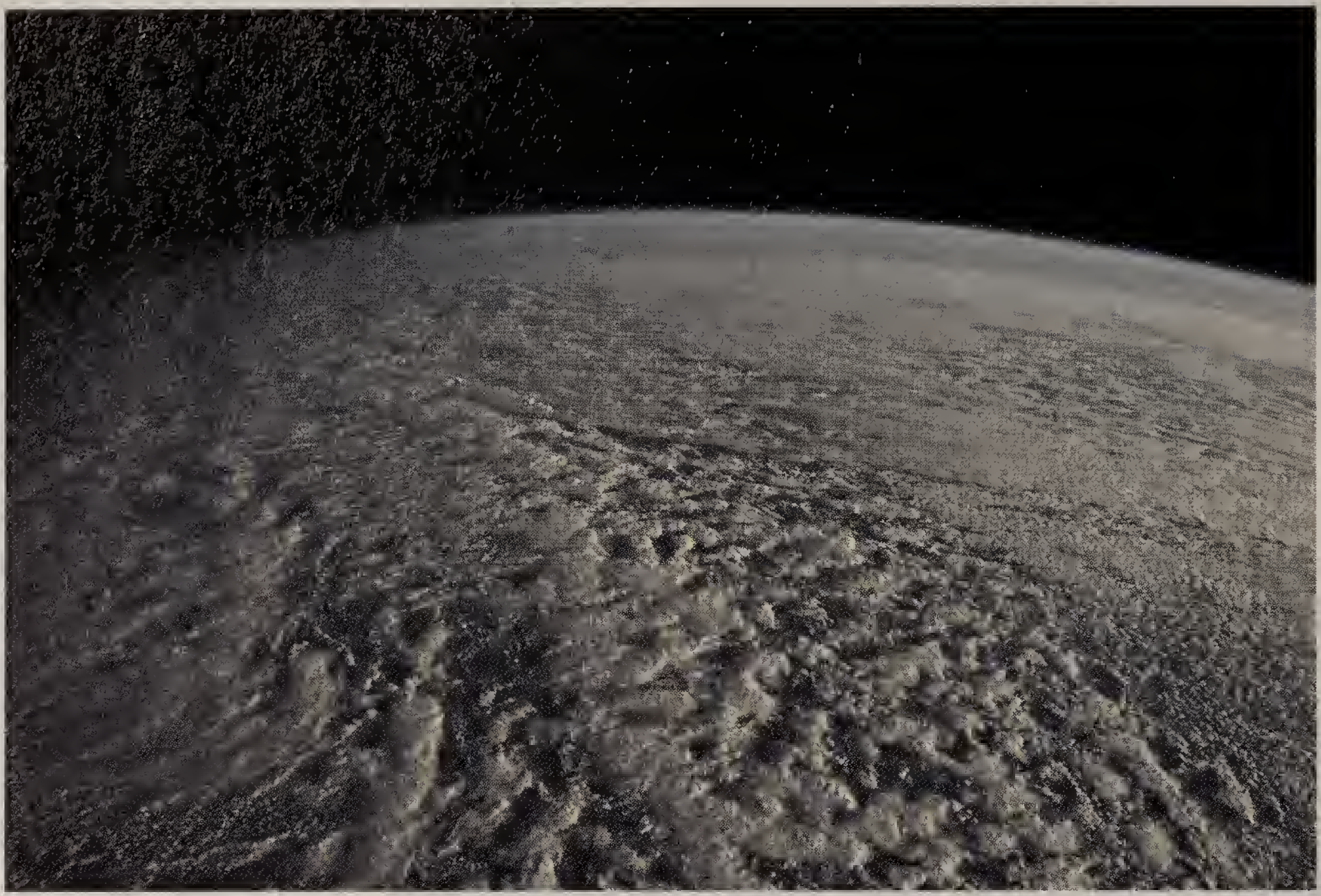

NASA

Cloud Computing's Big Debt to NASA

Large enterprises are betting big on the OpenStack cloud platform, which is deeply rooted in the space agency's ingenuity. By Patrick Thibodeau

IBM'S DECISION to base its cloud services on OpenStack may prove to be a key to establishing the fledgling open-source platform as the enterprise standard.

The announcement earlier this month follows similar moves by rival enterprise IT vendors Hewlett-Packard, Dell, Cisco, Red Hat and Rackspace, whose products are used by many Fortune 1000 companies.

That rapid rise of the three-year-old technology may not have happened without NASA — a fact that's worthy of note at a time of government budget cuts and retreats on government-funded tech R&D initiatives, which in the past led to the development of the Internet, GPS, lasers and other now widely used systems.

OpenStack's beginnings can be traced to a NASA project called Nebula, which was launched in 2008 to build what eventually became what NASA called an "open-source compute controller."

Nebula researchers released the project's compute engine code as open source under an Apache 2.0 license, and the code was used by Rackspace in its development of a cloud-based storage product called Swift.

Rackspace and NASA then joined forces to use the technologies to create OpenStack. The first OpenStack code was released to the open-source community in 2010.

Chris Kemp, NASA's first CTO for IT and the leader of the Nebula project, said that while a product similar to OpenStack would likely have emerged without NASA, the agency's involvement accelerated its development "and gave it a lot more credibility — quickly."

Rackspace CTO John Engates agreed, saying: "NASA lent a lot of credibility when it came to this being a truly open and altruistic effort rather than a Rackspace-centric effort with some ulterior motive. NASA made sure it was for everyone."

NASA CIO Linda Cureton is emphatic about NASA's role in the development of the technology. "If it were not for NASA, OpenStack would not exist," she said.

NASA raised eyebrows last year when it began using an Amazon.com cloud platform that's widely seen as a rival to OpenStack.

"Sometimes a prophet isn't appreciated in their hometown," Cureton said. "But I predict that as [OpenStack adoption] increases — as signaled by IBM's announcement — and the commercial viability continues to soar, NASA will be a consumer of the very capability they helped create."

"This is the way it should work. Our operating costs will be reduced, and we will help fuel the economic engine of our country," she added.

At its Pulse conference in Las Vegas, IBM announced that all of its cloud services and software "will be based on an open cloud architecture." At the same time, it also unveiled new private cloud offerings based on OpenStack.

Long a major supporter of Linux, IBM is also expected to be a major contributor to the OpenStack code base.

OpenStack clearly has momentum, said Charles King, an analyst at Pund-IT. But, he added, the fact that "pretty formidable cloud players" like Amazon, Microsoft and Oracle aren't using it suggests that "the market at large may not be ready for a de facto standard."

The technology's long-term success "depends on how competition in the cloud market shakes out over the next few years," King added. ◆

> "If it were not for NASA, OpenStack would not exist."
>
> — **LINDA CURETON**, CIO, NASA

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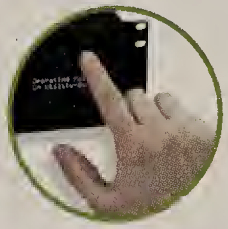

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THE Grill

Emmile Brack

A large analytics project offers insight into students' academic progress.

What's the next step in your career? "I definitely want to continue working in education. That's where I want to be. My next step is probably a COO role, where I can have a broader view of the organization."

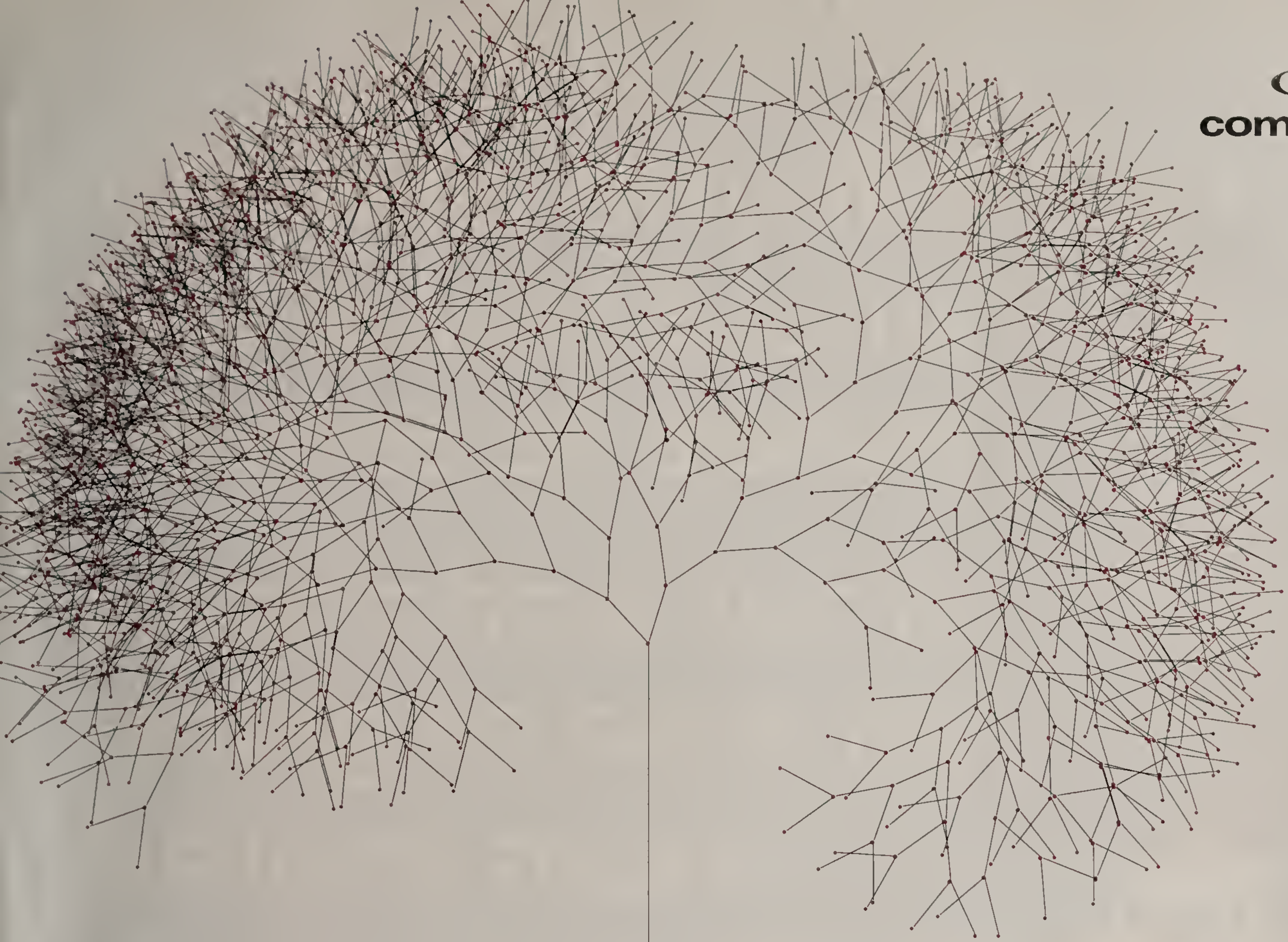
What accomplishment are you most proud of? "I'm most proud of the fact that I made the switch to a nonprofit and, specifically, education. Being brought into the mission of the work and the impact that organizations like Aspire have – that's extremely fulfilling."

What's the best advice you've ever received? "Be your own advocate."

Hobbies: "I love board games and puzzles, and I do them whenever I can."

EMMILE BRACK *leads the IT department at Aspire Public Schools, a nonprofit organization that manages 34 public charter schools throughout California. The system serves 12,000 mostly low-income students in kindergarten through 12th grade, and its goal is to get all graduating seniors accepted into four-year colleges. Brack is Aspire's vice president of technology. She says her department's task is to make sure Aspire's 1,500 employees and its students have the technology needed to transform the students' educational experiences. Brack says one way her team is meeting this goal is by deploying analytics tools. Here she talks about the lessons she has learned from that project.*

What did your organization want to achieve with the analytics deployment? The main reason for wanting to deploy analytics software was to save time for our teachers, principals and other teammates. We did a needs assessment and gathered that quite a bit of time was being spent by teammates crunching numbers or gathering data to see



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> **A lot of my team is really excited about new technology,** but if it's not grounded in work that needs to get done, it doesn't really matter.

how students were performing. That was extremely time-consuming and did not leave a lot of time to gather insights from that data analysis or to develop a plan of action to fix the issues.

Did the deployment achieve your goals? We've accomplished a lot with Tableau [analytics software], but there are areas where we want to use Tableau more in order to achieve that big goal around saving teammates time. We've rolled out reports and dashboards that have greatly improved efficiency around analysis and allowed our teachers and principals to spend more time on the insight and planning pieces. But there's still room and work for us to do around achieving that big goal.

What has been the biggest benefit with this analytics deployment? The ability to display and show longitude data on a specific student or on a specific school's performance. We take what we call the CSTs — the standardized tests that all students have to take — and we've been able to use Tableau to visualize trends and the performance of individual students and teachers, and schools as a whole and as an organization year over year. It's improving the ability for our teachers and principals to be more effective in their work. We could have done it without Tableau, but for a teacher or principal to do that, it would have been an enormous task.

What is the end result of this insight? That a piece of data doesn't provide answers, but it prompts a teacher to ask: Why?

What did you have to do to prepare technically for this deployment? We built out a data warehouse that served as a central repository for all of our organizational data, student achievement data, financial data, survey data. We built that infrastructure and we wanted to ensure that many, if not all, of our core operational systems were integrated. Unlike corporations that have the option of [using multiple] ERP systems, education technology doesn't have that type of system, so not all things are integrated like in an ERP. In education technology, there are software and tools that do one specific thing, so you have to piece your systems together and work to integrate them. The integration of our operational systems and the building out of our data warehouse happened over two years, and we continue to build it out and integrate systems as we add them.

What was the biggest mistake you made with this project? When we implemented the data warehouse and Tableau, the large appetite for data analysis increased even more. It seemed like the appetite was insatiable. And we were über-responsive. So there were hundreds of reports built out, but there's not a lot of structure around how they're organized. Simple things like [how to] make sure they're named correctly, what are the right folders they should be in, security issues around who should have access to what — that knowledge management we didn't necessarily think about ahead of time. It's sort of biting us now in that there are literally hundreds of reports out there, and we're trying to figure out which ones are most useful and which ones we can archive or delete.

You have a background in the financial and operations side of the house. What was the biggest benefit of having experience in those areas as you switched to leading IT? It helps me understand that IT should be grounded in a particular process and should support that process and not hinder it. As technology people, a lot of my team is really excited about new technology, but if it's not grounded in work that needs to get done, it doesn't really matter.

What was the biggest liability of that background? Because I'm not a highly technical person, there was a learning curve [in, for example, understanding things] as simple as our network infrastructure. I had a little bit of a blind spot to very foundational technology that's necessary to support things like the data warehouse and analytics. So that learning curve has been a little bit steep for me. But I ask good questions, and I'm getting up to speed.

What would you do again when taking on a new role? [Recognizing that] it's all about the team. All the successes we experience will be as a team. Knowing who I have on the team, knowing their perspectives, their work, what makes them excited about coming to work, I'd do that again. It helps build trust and gives insight into what our issues are.

— Interview by Computerworld *contributing writer* **Mary K. Pratt** *(marykpratt@verizon.net)*

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OPINION

S.J. VAUGHAN-NICHOLS

You Want Me in the Office? How 20th Century of You.

Every day I work with colleagues scattered around the world.

IN AN AVERAGE WEEK, I work about 55 hours. You probably won't be surprised to learn that I work from home. I say that because, in my experience, people who work from home tend to work harder.

One person whom that tidbit about my workweek might surprise is Yahoo CEO Marissa Mayer. Or maybe she would just think I'm lying. Mayer, quite famously, has told all of her company's telecommuters to spend time and gas money traveling to and from the office. It's part of her plan to turn the struggling Internet company around. Seriously. And she's not alone. Best Buy is doing likewise.

Fools.

Please don't think that this column is a self-interested rant, motivated by a fear that the anti-telecommuting mentality will spread until I too am back in a cubicle. I'm a freelancer; there's no office for me to return to. No, the fact is that I know that telecommuting has many advantages, for both employers and employees, and I believe it would be a mistake to regress.

The thing about judging a telecommuting program is that you have to decide what you want from your employees. It's been reported that Mayer looked at Yahoo's VPN logs and determined that too many telecommuters were spending too little time on the company network. More soundly, Best Buy had relied on a policy called Results-Only Work Environment (ROWE), which looks not at hours on the job but at performance.

ROWE's creators, consultants Cali Ressler and Jody Thompson, quickly got in on this debate, sending an open letter to Mayer. In the 1950s, they wrote, "collaboration required physical presence and lots of paper," but today, "we have numerous tools that allow us to work from literally anywhere on the planet."

Mayer argues that collaboration suffers when colleagues aren't constantly bumping against each other in hallways and the cafeteria. Well, every day I work with colleagues scattered around the world. We are bound together by email, instant messaging and that quaint 19th century invention called the telephone. I've collaborated on books with people who lived thousands of miles away. This very column is being written in Asheville, N.C., and it will be edited in Puerto Rico, copy-edited and formatted for the page in Massachusetts, and printed in Illinois. As to the argument that there's no real trust without face time: In one case, I wrote a book with a friend of over 20 years who I've yet to meet in the "real" world.

Sure, not every job is suitable for telecommuting. But for those that are, there are multiple benefits. As David Gewirtz, author of *How to Save Jobs*, has noted, Americans spend an average of 52 minutes a day commuting. That comes to about 225 hours a year. Most telecommuters that I know end up giving that extra time to their employers. They sit down at their workstation earlier and get up from it later. They aren't watching the clock but instead working on and completing tasks.

And what's the price of all that extra face time? Will companies have to buy or rent more space to accommodate the workers they call back into the office? Are they ready to pay for the power those extra bodies will use? Are they going to need more printers, parking spaces and support staffers? Put it all together and you get people spending less time on work while companies spend more money on office infrastructure. When you put it that way, Mayer's big idea just doesn't make any sense. ◆

Steven J. Vaughan-Nichols has been writing about technology and the business of technology since CP/M-80 was cutting-edge and 300bps was a fast Internet connection – and we liked it! He can be reached at sjvn@vna1.com.

Business Operations Per Second: Unparalleled Cisco Server Performance[1]

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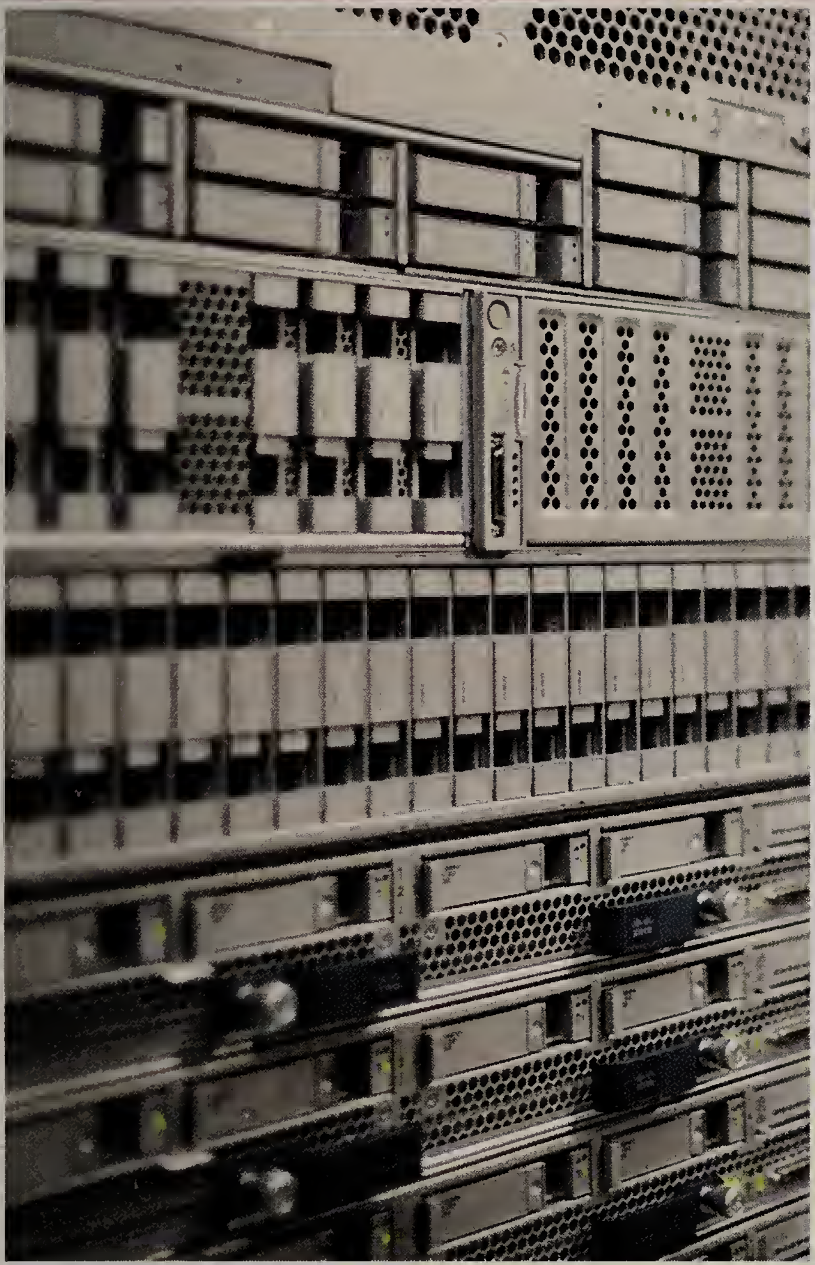

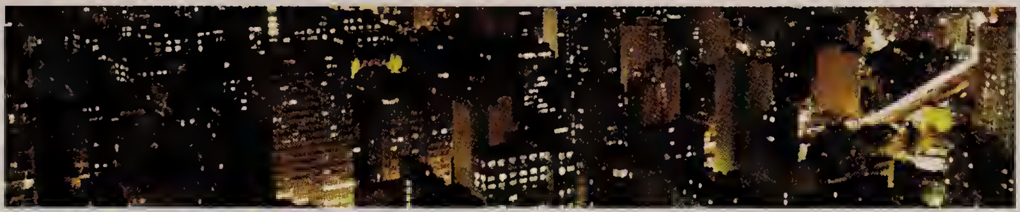

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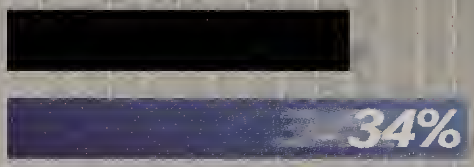
Cisco Unified Computing System



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1. Based on SPECjbb2005 benchmark on Cisco UCS C220 M3 server at 1,584,567 BOPS, 792,284 BOPS/JVM. 2. Based on TPC Benchmark C Results on 2 Processor Systems. Cisco UCS C240 M3 High-Density Rack Server with Oracle Database 11g Release 2 Standard Edition One, 1,609,186.39 tpmC, $0.47/tpmC, available 9/27/12 compared to IBM Power 780 Server Model 9179-MHB with IBM DB2 9.5, 1,200,011.00 tpmC, $0.69/tpmC, available 10/13/10. 3. Based on SPECjEnterprise2010 benchmark with 8 total Java EE Server processors on Cisco UCS B440 M2 servers at 26,118.67 EjOPS compared to RISC-based IBM Power 780 at 16,646.34 EjOPS. SPEC®, SPECjbb®, and SPECjEnterprise® are registered trademarks of Standard Performance Evaluation Corporation. TPC Benchmark C® is a trademark of the Transaction Performance Processing Council (TPC). The performance results described here are derived from detailed benchmark results available at http://www.spec.org and http://www.tpc.org as of 1-15-2013. ©2013 Cisco and/or its affiliates. All rights reserved. All third-party products belong to the companies that own them. Cisco, the Cisco logo, and Cisco UCS are trademarks or registered trademarks of Cisco. Intel, the Intel logo, Xeon and Xeon Inside are trademarks or registered trademarks of Intel Corporation in the U.S. and/or other countries. All other trademarks are the property of their respective owners.

DATA Deluge

As enterprise storage demands escalate, disk densities continue to rise. But the real magic is in software, where speed and size come together.

By Robert L. Scheier

DOUGLAS SOLTESZ, vice president and CIO at Budd Van Lines, is facing a common problem: A seemingly endless flood of data.

"If you gave me an infinite amount of storage, I could fill it," he says. The most recent four months of high-definition surveillance video from the company's offices and warehouses now consumes 60TB on his NexentaStor NAS and SAN platforms. That video is one reason his storage needs are growing 50% to 80% per year.

EMILIANO PONZI ILLUSTRATION

If he had twice as much capacity, he says, his users would just ask to keep their video twice as long.

With existing hard drive technologies ending their decade-long run of ever-increasing densities, IT shops are waiting for new technologies such as shingled magnetic recording (SMR) and phase-change memory (PCM) to boost storage densities. In the meantime, they are holding down costs — and boosting data access — with software that virtualizes, deduplicates and caches data on commodity disk drives, solid-state drives (SSD) and server-side flash memory.

Disk Density Gets Higher Still

After about 10 years of steadily increasing densities, disks that use perpendicular magnetic recording (PMR) are topping out at about 1TB per square inch, says Mark Re, a senior vice president at storage vendor Seagate Technology.

In the second half of this year, Seagate will begin shipping drives that use SMR to squeeze more data onto disks by overlapping the data tracks on them like shingles on a roof, says Fang Zhang, a storage analyst at IHS iSuppli. That should eventually boost drive densities to 1.3T to 1.4T bits per square inch, says Re, who adds that Seagate's SRM drives will start with desktop form factors and spread to other platforms such as storage arrays next year.

> If you gave me an infinite amount of storage, I could fill it.
>
> **DOUGLAS SOLTESZ,** VP AND CIO, BUDD VAN LINES

The next advance, which will take disk drives to 5Tbits per square inch, is heat-assisted magnetic recording (HAMR), which uses a small laser to change the magnetic properties of the disk, says Re. Seagate's first HAMR drives are expected in 2015 or 2016.

In the fourth quarter of this year, Seagate rival Western Digital is expected to release disk drives filled with helium, which provides less resistance than air and thus allows the addition of another storage platter or two to a drive. Those extra platters could lift the maximum capacity of PMR drives from today's 4TB to 5TB or 6TB, says Zhang. Western Digital says it also plans to release SMR and HAMR drives within about two years, and by the end of the decade it hopes to double hard drive density through the use of self-assembling molecules and nanoimprinting.

On the flash memory front, vendors are working to increase not only the density, but also the useful capacity and life span of flash memory used in server-based flash storage and SSDs.

The NAND flash on which most flash and SSD drives are based will begin to be replaced by a new form of nonvolatile memory called phase-change memory by around 2016, says Milan Shetti, CTO at HP Storage. Unlike magnetic recording that records data by changing the magnetic orientation of a physical piece of memory, PCM applies heat to change the electrical conductivity of the media. PCM drives are not only faster than NAND flash, but their memory cells can also withstand two to three times the number of read/write cycles as NAND flash, says Haris Pozidis, manager of memory and probe technologies at IBM's Zurich research lab. That's important for applications such as caching where data is constantly being read and written.

Shetti predicts initial drive capacities of about 200 to 250GB, with drive sizes at least doubling by 2018. He stresses that this will all be usable capacity, which is not the case in current SSDs, where 15% to 20% of raw capacity is set aside to replace cells that may wear out. Shetti says he expects prices per gigabyte to be comparable to those of current flash drives. That equates to a 15% to 20% price cut, since all of the raw capacity will actually be usable.

Dedupe: A Must-Have Feature

Over the past 10 years, deduplication — the process of eliminating duplicate copies of data — has moved from game-changing novelty to must-have feature.

Observers say not to expect any breakthrough increases in the amounts of data that deduplication can remove from hard drives. Currently, deduplication typically reduces data by a factor of seven to 10. Future improvements will come from increases in the speed at which data is deduplicated and from the use of standard deduplication systems across an enterprise.

Speeds will improve as a result of deduplication being performed in hardware rather than software, and in nonvolatile memory such as PCM, which is faster than today's NAND flash, observers say. Predicting that "every [nonvolatile memory] controller is going to have [deduplication] built in," Shetti also points out that, unlike disk drives, deduplication doesn't cause defragmentation on nonvolatile memory drives.

In-line deduplication, in which data is deduped before it is ever stored, reduces storage requirements from primary storage to backup and replicated copies. Pure Storage says its in-line data deduplication allows its flash arrays to store five or 10 times as much data as their designated size.

Observers also expect to see deduplication spread from its traditional use in backup to other applications and to more computing and storage devices. Dell says it plans to incorporate the deduplication technology it gained through its purchase of Ocarina into its EqualLogic and Compellant product lines, "first with compression primarily for . . . data like snapshots," and later for more frequently accessed data and files, says Travis Vigil, executive director for product marketing at Dell Storage.

Sean Kinney, director of product marketing at HP

Ensuring an always-on data center has the highest operational efficiency

PETER PANFIL

Why the power to save energy goes beyond eco-mode

In today's always-on, always efficient data center environments, it's easy to get caught up in the numbers, especially when it comes to UPS performance.

AVAILABILITY IS THE HIGHEST PRIORITY of any data center, and the UPS system is the keystone that ensures the data center is always powered. At the same time, cost savings and energy efficiency are common business priorities. When planning for a UPS, it pays to consider multiple efficiency strategies that will effectively support availability requirements.

Avoid the Ratings Game

Thanks to advances in UPS technology, the potential to cut energy costs by tens of thousands of dollars annually has never been greater. But don't be swayed by a 1 or 2% efficiency difference unless availability for the data center is the same for each UPS option.

Higher Voltage = Bigger Savings

It might sound strange to think that increasing your system level voltage can actually save money, but it can — and a lot of it. 575/600VAC from the source, through the UPS and distribution, uses more of the available capacity of gear, breakers and wiring. Adding a PDU that compartmentalizes faults and runs the IT equipment at its highest efficiency point delivers the most bang for the buck.

Think Eco-Intelligent

Eco-mode has done wonders for improving UPS efficiency, but it comes with a cost: some methods of switching to eco-mode and back again may leave availability vulnerable. Ask the UPS supplier to explain how the equipment safely switches to and from eco-mode, and ask to see the waveform at the point of transfer to ensure that the power is free of disruptive notches.

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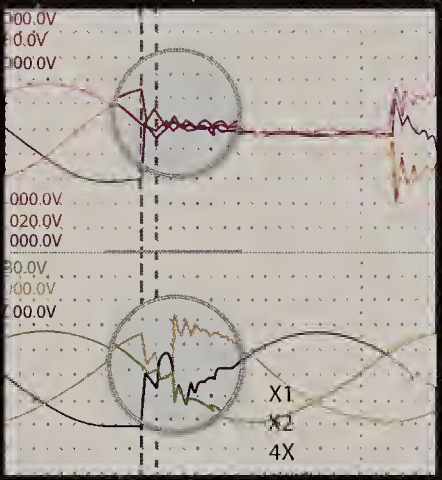
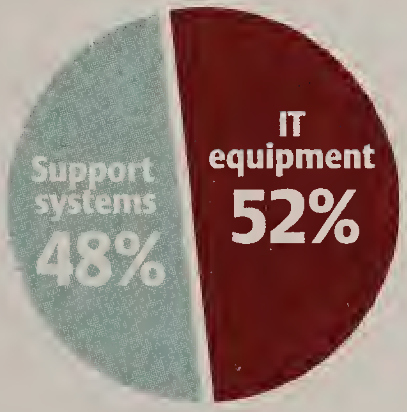


When transferring to eco-mode, make sure the UPS provides a continuous, uninterrupted waveform - interrupted transfer notches are potentially disruptive to operation.

Total Data Center Energy Consumption



About the Author: **Peter Panfil** *is Vice President of Liebert AC Power, Emerson Network Power*

By the Numbers*

48%	Energy use of infrastructure equipment— cooling, UPS, PDU and lighting
56%	Growth rate of electricity consumption globally between 2005 and 2010
$6K	Estimated cost to operate a server annually in a typical data center
6-7%	Estimated savings achieved by deploying a UPS with higher voltage and Intelligent Eco-mode

*Citations from Energy Logic 2.0; Growth in Data Center Electricity Use 2005 to 2010; and VMware TCO Calculator

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TO THE RESCUE: Old, Slow Disk and Tape

EVEN AS RESEARCHERS FIDDLE with material science and software developers fine-tune clustered file systems, two old standbys — slow, cheap, spinning disk and even older tape drives — are playing a crucial role in managing the storage flood.

For customers using CleverSafe storage appliances, for example, "5,400 rpm and 7,200 rpm drives are the way to go" to achieve the lowest cost per gigabyte in dollars, power, cooling and space, says Chris Gladwin, Cleversafe's president and CEO. And Seagate senior vice president Mark Re points out that, not only would it be costly to replace every hard drive with flash, but it would also be impossible to manufacture that much flash.

Tape is even slower and less expensive than disk, and it's often derided as clumsy, hard to use and prone to failure. Nonetheless, "tape enjoys a significant space efficiency advantage over disk storage by virtue of its ability to pack more recording surface area into a given physical volume," according to a blog post by Eric Slack, an analyst for Storage Switzerland, an IT analyst firm based in Fort Worth, Texas.

According to an April 2012 presentation by IBM Systems Technology Group, while NAND flash and hard disk drive densities will grow 20% to 30% by 2014, tape densities could grow by 40% to 80%.

Therefore, Slack argues that tape will continue to be a good option for handling big data, which will consist of "file-based reference data that's stored for long periods but must still be available in a relatively short time frame."

— ROBERT L. SCHEIER

Storage, predicted the rise of unified deduplication platforms that organizations can use for all of their applications and storage. That, he says, will reduce licensing, training and management costs as well as the amount of storage an organization must buy.

Performance Meets Speed

Some users aren't upgrading their storage systems solely because they need help managing large volumes of data; they're also driven by the need to access data quickly.

Case Western Reserve University is moving 100TB of research file data from an EMC Celerra NS480 to a Panasas ActiveStor 8 for rapid analysis, and another 65TB of structured administrative data to a Nexsan NST 5310. Besides higher performance, users wanted to create single name spaces as big as 600TB — far above the 64TB limit of both EMC and NetApp offerings, says Brian Christian, design senior technical lead at the school.

"Our first, small, high-performance cluster" used a traditional NAS device acting as Network File Server, "and we overloaded it. After talking with our peers, we saw that to grow as we needed, we needed a parallel NAS. That's when we acquired Panasas," says Christian.

To boost performance, many customers are using flash memory within servers, as well as solid-state drives in storage arrays, to cache speed-sensitive data before writing it to slower, but less expensive and higher-capacity hard drives.

Three years ago, slowing application performance and increasing upgrade costs spurred David Abbott, manager of IT infrastructure engineering at TripPak Services and ACS Advertising, both Xerox companies, to look for new platforms that could handle his expected 10TB of new storage per year "without management having a heart attack" over cost.

The software-as-a-service provider for the transportation industry is now using three network-attached storage (NAS) units from Starboard Storage Systems for storing 80TB of image files and 45TB of performance-sensitive data for 500 virtual machine images and more than 200 virtual desktops on a Pure Storage flash array.

Before moving to the Nexanta NAS/SAN platform, Budd Van Lines had relied on a Compellent SAN. While it wasn't full, "it was running out of IOPS" to handle a growing number of queries among applications for work such as month-end accounting, he says. To provide that performance, the NexantaStor platform caches data in solid-state drives for faster access, before writing that data to 7,200 rpm serial attached SCSI (SAS) drives for long-term storage.

NAS vendor NetApp also entered the flash array market with its EF540, the first in a line of arrays it says will combine consistent, low-latency performance, high-availability and integrated data protection with enterprise storage efficiency features such as in-line deduplication and compression.

Software Plus Commodity Disk

Online marketing SaaS provider Constant Contact is among those turning away from proprietary hardware and software to commodity disk managed by software.

"When I joined three and half years ago, our primary way of scaling was to buy more storage, faster storage, and bigger and faster database servers," says CTO Stefan Piesche. To reduce costs even while his storage needs grow 15% to 25% per year, he is switching from IBM's DB2 database running on 3Par SANs to the open-source MySQL and Cassandra NoSQL databases running on Dell servers, commodity disk and Fusion-io flash cards.

This new platform, he says, is not only an "order of magnitude faster" than its older storage but delivers high performance, availability and disaster recovery without the need for extensive management. The performance gain achieved by writing data to six storage nodes without transferring it over the network means storing multiple copies of the same data. However, says Piesche, the low price of commodity disk and servers make the trade-off worthwhile.

He also notes his customers won't suffer if the marketing data stored in one of those copies is a few milliseconds out of date — although that wouldn't be true for a financial trading system where prices constantly change.

"Sharding," or splitting databases also helps Constant

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Contact scale easily, he says. "We can put a set of customers on Databases A, B and C, [which are] usually multiple instances of the same database with the same schema. We want them to be identical and on commodity hardware, to keep our operational costs low, so it's a non-event to roll out a new one. For 50,000 customers, we add two commodity database servers running MySQL," with no performance hit on other users, says Piesche.

Another vendor in this space is CommVault, which says its Simpana software platform cuts storage costs by up to 50%, administrative overhead by up to 80% and annual support costs by up to 35% by reducing the number of copies of data stored as well as the number of storage-related applications to buy and maintain.

> **"For the vast majority of people there's no such thing as a data recession.**
>
> **GREG SCHULZ,** FOUNDER, STORAGEIO

Sanbolic claims its Melio5 data management platform provides high availability, application scale-out using shared-data server clusters, fast access to any size files in a variety of workloads, and is scalable to more than 2,000 physical or virtual nodes and up to 65,000 storage devices. Its Latency Targeted Allocator allows the Melio platform to share server-side flash and SSDs within storage arrays, as well as conventional hard drives, across nodes. This eliminates single points of failure and hard-to-access data and application silos, says CEO and co-founder Momchil Michailov.

Some newer vendors package their software in the form of physical hardware with disks and processors. Gridstore's storage appliances virtualize storage controllers as well as data to eliminate single points of failure and provide faster, parallel data access from many servers. This allows the number of controllers to grow, tapping unused computing power to scale performance as well as capacity. However, it currently supports only Windows and file-based storage.

Another software-based approach to scalability is distributing "slices" of data over many physical databases. Cleversafe's dsNet technology, also sold as appliances, works best with more than a petabyte of storage, made up of objects more than 50 to 100KB in size. This is ideal, says President and CEO Chris Gladwin, for applications such as photo sharing over the Web.

What's Next

As hard drives get bigger and faster, flash gets bigger and more reliable, and open-source storage stacks mature, some industry watchers see fundamental changes in how organizations cope with the data flood.

With the adoption of new nonvolatile memory technologies, the need for tiering data between solid state and spinning disk will diminish as new technologies become cost-competitive with higher-end Fibre Channel and SAS disks, predicts Shetti. Higher-capacity, lower-cost SATA disks will still have a role, but he says the complexity of packaging and different software interfaces will discourage users from mixing nonvolatile memory and SATA in the same system.

Within three to five years, the price of flash drives will be somewhere around the same cost as high performance disk, says Hu Yoshida, CTO at Hitachi Data Systems. They are already at parity, he says, when the capacity of the hard drives is reduced by short-stroking (using only part of the disk capacity to speed performance by reducing the distance the read/write heads must travel to reach the data) and by writing data across multiple disks in RAID data protection configurations.

Even commodity hard drives, however, will gain speed as vendors add more cache to them. Seagate expects such "hybrid" drives to make up most of its product line by the middle of the decade.

Cloud storage services will provide slow but extremely low-cost archiving services to reduce the in-house storage load. Amazon Glacier, for example, costs as little as 1 cent per gigabyte per month. While "it could take three to five hours to retrieve that data," that might be no longer than it would take to restore data from tape stored offsite — and Glacier would be cost-competitive with tape, says Greg Schulz, founder of consultancy StorageIO.

"Object stores can reduce storage costs and complexity by eliminating the need for hierarchical file systems," says Gladwin. "In a very large data storage system, running a file system [requires] additional racks of servers" that consume power, take up space and cost money. With an object store, he says, an application such as a social media website lets a user search for friends without using a file system.

Meanwhile, IT shops continue to be drawn to the cloud's combination of cost efficiencies, low-cost hardware and low-cost, open-source software.

Constant Contact, for example, is considering "private storage clouds," possibly using open-source software, on the system of a provider such as Amazon S3, for the low costs and "almost unlimited horizontal scale" they can deliver, says Piesche. Using Cassandra, for example, he says he would like to scatter storage clusters among distributed data centers for disaster recovery "without any licensing costs, without any complicated setup and without any manual intervention."

The replication capabilities he needs aren't available yet. But he has to keep looking because, as Schulz says, "For the vast majority of people there's no such thing as a data recession." ◆

Scheier *is a veteran technology writer. He can be reached at bob@scheierassociates.com.*

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Storage FOR THE Everyman

IT staffers at all levels are now tasked with managing data storage. They demand simplicity (but want power, too). **By Kevin Fogarty**

THE TORRENT OF DATA that threatens to overwhelm many corporate IT departments has driven demand for new types of storage technology. Storage managers aren't asking for ever-larger, ever-more-complex boxes like those that play leading roles in traditional marketing campaigns and vendor bragfests.

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Storage managers need faster, higher-capacity hardware to keep up with volumes of data that nearly double every two years. What they need even more, however, is simplicity.

"With budgets growing slowly and head counts actually going down a bit, the challenge eventually becomes, How do you manage 30% more data without 30% more budget or 30% more head count?" says Dick Csaplar, a virtualization and storage analyst at Aberdeen Group.

Aberdeen's research indicates that most companies have between eight and 18 storage specialists on staff, most with job descriptions that have been expanding for years.

"It's not enough to know which box in the warehouse has the tape with the data you need," says Csaplar. "You have to be able to run e-discovery searches and produce the data within strict time limits. That's a big change even with the same amount of data."

Simply storing, tracking and securing vast amounts of data is a challenge for any IT department, but the oceans of data are to blame only for the demand for storage space, not for IT's limited ability to deal with it, according to IDC storage analyst Ashish Nadkarni.

IT's real difficulty — the lack of storage specialists and, ultimately, the need for simpler solutions to complex storage problems — started with one of the biggest wins corporate IT has ever had: server virtualization, Nadkarni says.

Virtualized systems are more efficient than older equipment, and they changed IT in fundamental ways. Rather than having one group of specialists responsible for all the storage, another responsible for applications and a third for servers, Nadkarni says, responsibility for all three fell, usually, to a single administrator.

That change was so fundamental that it rippled throughout IT, forcing organizational changes designed to match what the company was trying to accomplish with virtual servers, virtual apps, mobile devices, cloud platforms and all the other follow-on technologies, Csaplar says.

"Ultimately, everything else has to get simpler because virtual-server admins don't have time to learn a lot of overly complex interfaces," Kerns says.

Finding Efficiency in the Cloud

IT found some of the simple efficiency it needed in the same technology blamed for at least part of the flood of data that is drowning IT: the cloud.

Discount travel website Kayak.com, for example, found that building file-sharing systems that its developers could use to exchange code, graphics and other files was far more complicated and troublesome than just handing the job off to Dropbox — a Web service that has become the poster child for free, unmonitored consumer storage.

> **The challenge eventually becomes, How do you manage 30% more data without 30% more budget or 30% more head count?**
>
> **DICK CSAPLAR,** VIRTUALIZATION AND STORAGE ANALYST, ABERDEEN GROUP

"We have the file servers and VPN and whatever else, so we could have just set up a file-share ourselves," says Bill O'Donnell, chief architect at Kayak. "It's less of a headache to use Dropbox than it is to provision a big RAID array in the server room and set up LDAP groups and work through issues with the VPN and answer calls from people in [the] Zurich [office] who hate using it."

Kayak uses the year-old Dropbox for Teams service, which acts as a central repository for teams of any size, keeping everyone up to date using Dropbox client software that automatically replicates any changes made on the service to whatever device a team member is using at the time.

The service costs $795 per year for five team members and $125 for each additional member. There is no limit on the amount of space they can use, but a Teams account starts with 1 terabyte of storage, according to Dropbox.

"Doing it ourselves would be time-consuming and frustrating, and Dropbox is pretty easy and people know we'll get those files onto their disks without their having to do much about it," O'Donnell says.

Dropbox for Teams encrypts data being transmitted across the Internet and gives administrators a simple interface that tells them which team members are logged in and from where. It can also link or unlink applications to data on the service and log all activity to give admins a simple view of everything at one time, according to Anand Subramani, product manager for Dropbox's Teams service.

Since early February, Teams has also supported two-factor authentication, which increases security by requiring not just a user's username and password but also a passcode from a separate device only the user holds.

Other cloud services are also adding business-friendly management features, but cloud-based storage has proved itself secure and reliable enough for many companies to use the same version that consumers use, according to Randy Kerns, a senior strategist at Evaluator Group, a storage consultancy.

"Information is leaking out everywhere — mobile devices, personal cloud accounts, home devices, you name it," Kerns says.

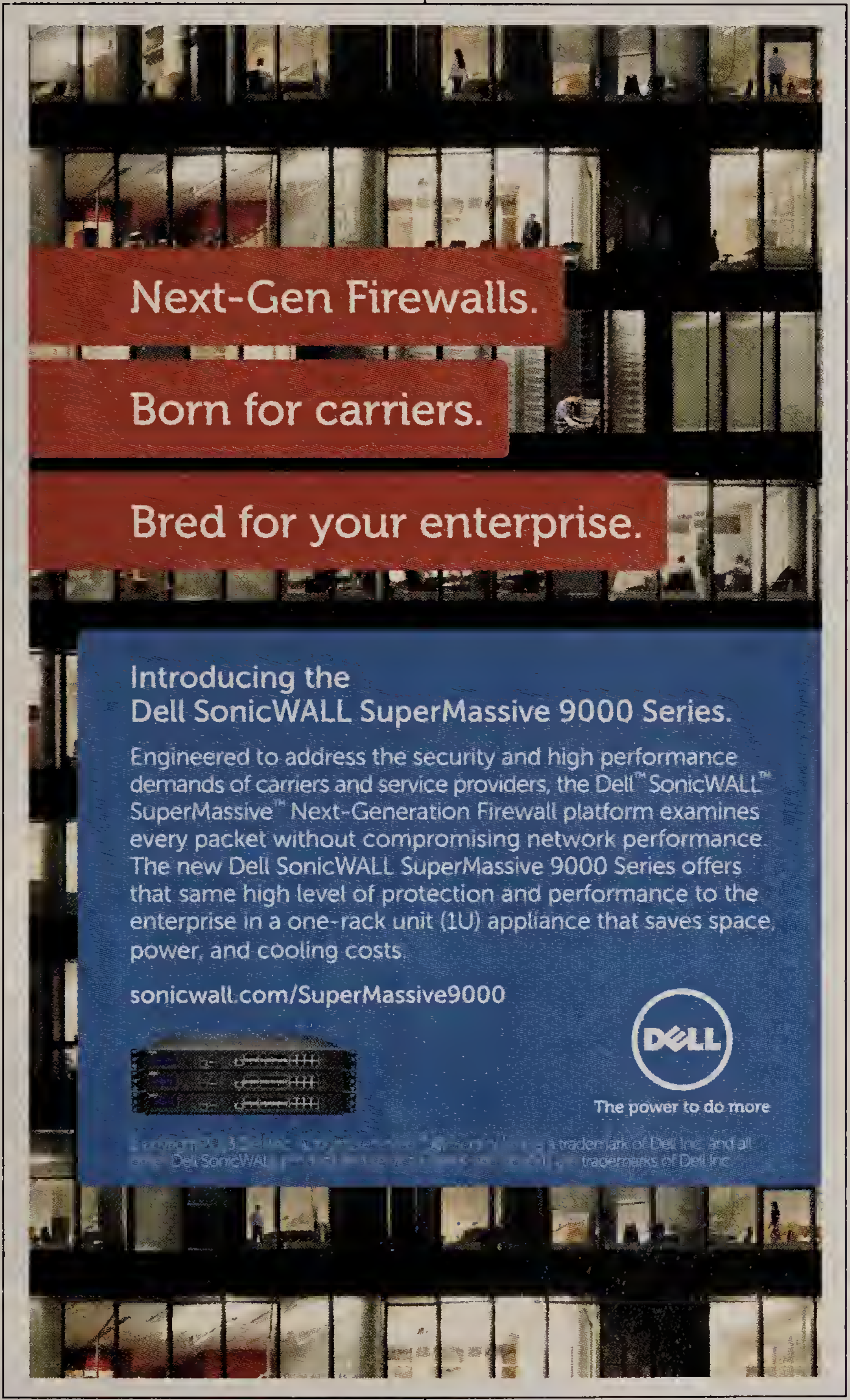
That kind of "leak" and the decision to use cloud services aimed at consumers may look like red flags to traditional IT storage managers but are actually reasonable accommodations to both the needs of users and the reality of short-staffed IT departments, he says.

"People inside a company look for the simplest way to get something done, which has been a big force in cloud and mobile and other areas," Kerns says. "IT has had to react to that, so they're asking for ways to monitor who's doing what [and create] some kind of tracking for the data."

Cloud: Not the Whole Problem

Using the cloud for discrete functions like file sharing for a single department or SaaS application instead of one installed on-premises can make some storage issues easier to deal with. But that doesn't address the core problem, analysts say.

The difference in upfront capital expense is so great that Kayak would almost certainly house most of its software on Amazon's EC2 or other commercial clouds rather than the on-premises storage and Linux servers it uses now, O'Donnell says.



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The tools available to configure storage networks and RAID arrays were "pretty heinous" in 2004 when Kayak was founded, O'Donnell says.

"It's getting better, though. Load balancers, the consoles to set up the arrays have improved by leaps and bounds over the past few years," he says. "It's almost like consumerization: People get used to highly consumer-oriented user interfaces and very slowly the enterprise [vendors] are catching up."

The key to simple storage management isn't a series of point products or appliances, Nadkarni says. It's a set of abstraction and automation tools that allow nonspecialists to manage a company's storage resources with easily learned tools or interfaces.

EMC's FAST (Fully Automated Storage Tiering), for example, was designed to move data from expensive, solid-state drive (SSD) systems or high-performing disk arrays to less expensive media based on how often the data is used. Originally designed to work only with EMC's physical disk arrays, the system is now able to manage data for virtual servers and include all-SSD storage in its migration decisions.

"Efficiency comes from automation, and a lot of the automation is coming from things like FAST — from storage optimization software from other vendors that allow storage to be easily managed without people having to deal with performance issues or spend hours moving data from one place or another," Nadkarni says.

Most of the big storage vendors talk as if they're more advanced than they actually are, however, Kerns says.

"The issue is more than just how to make things more user-friendly. They need to make the core functions of the whole information management infrastructure easier to access and easier to apply," Kerns says. That's exactly what EMC did last year when it adapted the popular software that controls its lower-end systems to also manage Symmetrix — a high-end storage system with a reputation for being difficult to configure and manage, Nadkarni says.

IBM has done something similar by expanding its Tivoli Storage Manager into a storage-infrastructure system designed to cover storage from IBM and other vendors.

"The questions they have to ask are 'Can we do it quickly?' and 'Can we do it simply?'" Nadkarni says. "Virtualization created a huge shift in how storage is consumed and forced vendors to create automated workflows that permit provisioning from different platforms and offload some storage tasks to admins," Nadkarni says. But it may not be the big vendors that define the future of convenient enterprise storage, Csaplar says.

"There are so many startups out there doing innovative things much faster than the big vendors that the big guys [like IBM, HDS, EMC and NetApp] may not catch up without a lot of acquisitions," Csaplar says.

The limitation of startups is that their scope tends to be narrower than that of big vendors that aim to offer comprehensive storage infrastructure management systems rather than tightly focused, highly automated systems.

"If you look at Dropbox or a NAS vendors like Synology, or NetGear's ReadyNAS, they're coming at [storage management] from a different direction, almost coming from the bottom up to eat things like FAST and the other IT-focused things," O'Donnell says. "Synology started more as a home or small business thing, but that console is incredible. It's windowed, interactive, almost like a Windows system. You'd have killed to have it 10 years ago.

"The bar for how good a user interface or management system is has been raised, a lot," O'Donnell says. "The big guys will have to catch up."

Fogarty *writes about enterprise IT. You can follow him on Twitter (@KevinFogarty).*

STRAIGHT TALK ON SECURITY

From phishing your own employees to sharing your company's hack history, these techniques can help you get – and keep – users' attention about security. **BY STACY COLLETT**

THE STATISTICS ARE STAGGERING: Last year, Symantec blocked more than 5.5 billion malware attacks, an 81% increase over 2010, and reported a 35% increase in Web-based attacks and a 41% increase in new malware variants. Those findings, documented in the company's latest annual "Internet Security Threat Report," might cause IT leaders to wonder if they're doing everything possible to protect their organizations.

THINKSTOCK

And well they should. Security folks, in struggling to establish policies and procedures that are both effective and easy to implement, often forget a crucial step, experts say: communicating their security goals effectively, so that employees not only follow the security procedures but also understand the reason for having a security policy and embrace its goals.

"Compliance is necessary, but it's not sufficient," says Malcolm Harkins, vice president and chief information security officer at Intel. Harkins' goal is to get employees to go beyond compliance toward full commitment to protecting the company's information. "If they're committed to doing the right thing and protecting the company, and if they're provided with the right information, [then] they'll make reasonable risk decisions."

> **Compliance [with the company's security policy] is necessary, but it's not sufficient.**
>
> **MALCOM HARKINS,** VICE PRESIDENT AND CHIEF INFORMATION SECURITY OFFICER, INTEL

To be sure, employees don't play a role in every type of corporate security breach (see chart). But user behavior and noncompliance are implicated in many, including mobile malware attacks, social network schemes and advanced target attacks. In the face of such an onslaught, a wall poster of security tips hanging in the break room is useless, says Julie Peeler, foundation director at the International Information Systems Security Certification Consortium — also known as (ISC)² — a global, nonprofit organization that educates and certifies information security professionals.

Managers need to ensure that employees understand the security posture of the company from day one, Peeler says. Employees must be willing to sign confidentiality agreements, attend training and practice ongoing vigilance. "Security training is not a one-time event. It has to be integrated throughout the entire organization, and it has to come from the top," she says.

Here's a look at five best practices for making information security a corporatewide responsibility.

1 Put Threats Into Context

People don't internalize security best practices by simply being told what to do or by being scared into compliance, Peeler says. And Harkins agrees: "You don't want to spin information security compliance as fear," he says. "Fear is like junk food — it can sustain you for a bit, but in the long run it's not healthy."

Instead, both experts say, employees are more likely to be motivated into compliance if security managers can put risk into a context that relates to them directly. Most employees know that a security breach affects not just data, but also the company's brand and reputation. But Harkins notes that employees in some business units might not fully understand that they could play a role in a breach just by doing what they consider business as usual.

A marketing team, for instance, might want to launch a new interactive website ahead if its competitors, he explains. The website's content might seem harmless if, for example, it doesn't include intellectual property — just a few interactive screens and videos. But what if a third-party provider that helped develop the site left vulnerabilities that allow a hacker to implant malware in one of the links on the site? Explaining such risks ahead of time, and in a way that's specific to the department's line of business, helps ensure the group will do what's necessary to mitigate damage, Harkins says.

Real-world examples can also drive the message home. When a data breach makes the news, use it as a teaching tool — in training classes, via email or through video presentations. Discuss the likelihood of a similar breach occurring in your organization. Ask: How would a breach like this have affected our company? What people or business units should remain extra vigilant against a similar attack? What security measures do you already have in place to protect against such an attack?

2 Go Phishing, Internally

Another effective technique is to launch simulated phishing scams. Then see how many employees take the bait, and offer advice on avoiding similar real-world scams.

Royal Philips Electronics recently launched a pilot program of controlled phishing attacks, says Nick Mankovich, chief information security officer. Working with a professional phishing partner, whom Mankovich declined to name, Philips simulates an email scam that tries to get employees to click a link to a website and then enter their password and username. When an employee clicks on the link, a message pops up explaining his

TOP 10 THREAT ACTIONS USED IN ENTERPRISE ATTACKS

Threat Event	Percent of Breaches Used In
Stolen login credentials	30%
Backdoor malware	18%
Backdoor or command-and-control channel hacking	17%
Physical tampering	17%
Keylogger/form-grabber/spyware	13%
Pretexting (classic social engineering)	12%
Brute force and dictionary attacks	8%
SQL injection exploits	8%
Phishing (or any type of "ishing")	8%
Command-and-control malware	8%

SOURCE: ANALYSIS OF 855 CONFIRMED ORGANIZATIONAL DATA BREACHES INVESTIGATED IN 2011 BY VERIZON RISK TEAM OR ONE OF ITS INTERNATIONAL FORENSIC PARTNERS IN ITS 2012 DATA BREACH INVESTIGATIONS REPORT. TOTALS EXCEED 100% BECAUSE INCIDENTS OFTEN INVOLVE MULTIPLE THREAT EVENTS.

error and offering tips to avoid being scammed in the future.

"It's not about embarrassing or surveilling anyone. It's really about giving material that means something at the moment when they click on the [phony] link," Mankovich says.

Depending on the exact nature of the attack, tips might include questions like: Did the email come from a trusted source? Was there something misspelled or unusual about the link? Did you remember to hover the mouse over the link and check the bottom of the screen to see if the actual target URL matched the one in the body of the message?

So far, Philips has conducted three phishing experiments involving 250 employees each; eventually, Mankovich hopes to test all of the company's 90,000 email-connected employees worldwide. Future tests will be stealthier and more intricate, he says.

"At the end of each pilot, we talk to a few of the users to see what they felt about the experience — both those who fell for the phishing and those who did not," Mankovich says. "We [typically] have a very small percentage of people who did the bad behavior, and those people do get the message."

3 Protect to Enable

In light of the increasingly virulent cyberthreats out in the wild, IT leaders struggle to protect the organization while giving business units the freedom to choose their own apps, launch their own online initiatives and adopt new devices. But "the more drag you put on information flow, the slower the business velocity, which also creates strategic risk issues," Harkins says.

That's why Intel adopted the mantra "protect to enable" three years ago. Rather than focusing primarily on locking down assets, the information security group aims to enable business goals "while applying a reasonable level of protection," Harkins says. To do this, IT needs three things: an adequate level of understanding of the business side's situation and needs, input from both technical and business professionals on the risks and rewards of a given security decision, and a clear channel of communication among all levels and units of the business.

In 2009, Intel's IT department partnered with the company's legal and human resources groups to define security and usage policies for a new bring-your-own-device program. The company began allowing access to corporate email and calendars from employee-owned smartphones in January of 2010, Harkins says. The initiative has been successful in keeping corporate data safe while allowing employees to use their own devices for work. And as new devices come on board, the company continues to define new security and use policies.

4 Share Your Company's Hack History

Although controversial, sharing — in confidence, of course — the number and nature of attempted hacks on your company's systems can be a strong motivator toward security compliance, Peeler says. "People don't really understand how often a company's own systems are under attack," she points out.

Harkins agrees. Security leaders, he says, "have got to show data, and relate it to the business goals" and then they have to show how progress toward achieving those goals will be affected if ongoing incidents are not addressed. "The more your predictions start to come true," he adds, "[the more] you're demonstrating that you know what you're doing and that you're not trying to impede the business — you're trying to help the business."

SAYING 'YES, BUT...'

A little flexibility goes a long way toward getting employee buy-in on security.

INSURANCE PROVIDER Endurance Specialty Holdings tries to establish policies that don't limit users from performing their jobs, says CIO Tom Terry. "There's generally a good reason why they're asking for a particular software, tool or device. We attempt to understand the problem they're trying to solve and give them tools to address their needs in a secure manner."

For instance, many business units needed USB devices to transfer data, but the IT organization knew that USB devices can be a major contributor to data loss if they're not managed properly. So the Endurance IT team said "yes, but..." by distributing the devices but also instituting – and explaining – a policy mandating that the devices had to be password-protected and encrypted.

"When the business sees you working with them in a collaborative fashion, then you can move the dial forward" in terms of a shared corporate response to security, says Terry.

– STACY COLLETT

Intel has found ways to put breach data to good use without sharing too much confidential information. For instance, Harkins says, "we had an employee who stole intellectual property from us a few years ago and was convicted earlier this year. We posted to all employees the story of what happened, how we found out, and reminded everyone of the expectations we have of them."

Intel also posts its lost or stolen laptop rates and shares mistakes made by employees, such as posting information to a social site, and describes the risk that created for the company. "But we don't share who did it or other details that would embarrass or create issues for the employee," Harkins clarifies.

Others have mixed feelings about such tactics. Mankovich says sharing information about breaches "bears consideration," but he worries that any shared information could jump the fence to the outside world. "My first reaction is that, with 124,000 employees in 60 countries, we couldn't avoid it going public," Mankovich says. "We must consider the downside of providing the bad guys with attack intelligence. That in itself might increase risk."

Ultimately, convincing employees to remain vigilant is a job shared by both IT and the business. "We really have to understand how the workforce is changing, how are we changing the workforce, and how the expectations of people who use our products or partner with us are changing," Mankovich sums up. "The job is endless, but it's exciting." ◆

Collett *is a* Computerworld *contributing writer. You can contact her at stcollett@comcast.net.*

Security Manager's Journal

MATHIAS THURMAN

Trouble Ticket

At issue: R&D plans a lab for assessing the security of the company's security products.

Action plan: It's good news, and guidance from the security manager will ensure that it's done right.

Security Lab Is a Promising Step

The R&D department will have a sandbox for testing the company's software products. For once, security isn't last.

IT'S A GREAT THING when a security manager doesn't have to go into battle mode every time a new corporate initiative emerges. When other departments show signs that they aren't putting security last, I can relax a bit. But just a little bit. Even in those cases, I want to have input.

For the most part, I was happy when the R&D department came to me last week to discuss their plan to create a software security test lab. The R&D team has been charged with enhancing the security of the software portion of our products, and one of their requirements is to create an environment in which they can run hacking and assessment tools and code-scanning software. That will free them up to conduct such activity whenever they want, without notifying anyone. When my department conducts security assessments or penetration testing against our corporate applications, we schedule the activity at a time that minimizes the impact, and we let everyone know.

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Before the architecture team went to work designing the lab, I created a set of security requirements. The first and most important was that the lab must be segmented from our production network. Other requirements included a separate firewall protecting the lab from the corporate network and extremely limited access to the public Internet. I don't want any inquisitive engineers running scans against resources on the Internet — that could get us into trouble. Also, access to the lab must be controlled and logged.

The lab will be segmented into several virtual LANs, with firewall rules in place to protect one VLAN from another. For example, one VLAN will contain the various security tools for running assessments, penetration testing, code scanning and other activity. The products to be tested will reside on another VLAN, while any source code will reside on yet another. Most of the resources will be installed on virtual machines, so the servers can be quickly taken down and redeployed if necessary. We will set up a bastion host, with access to the lab network restricted to those who have access to the lab itself.

At least at first, we'll stock the lab with some fairly common tools, and then upgrade as the engineers get properly trained on how to conduct assessments. One will be Nessus, a fairly easy-to-use tool that scans for server misconfigurations and also has an extensive menu of plug-ins, including a variety of application vulnerability checks. Another tool will be Metasploit, which is one of my favorites. It can be very helpful in running attacks against potentially vulnerable systems. For example, if you discover a SQL injection vulnerability, Metasploit can attempt several SQL attacks that will validate the vulnerability — you don't have to be an expert in SQL. That's definitely handy, since SQL injection has been used in many recent attacks compromising user passwords.

Another of my favorites is BurpSuite, a set of application assessment utilities that let you do things like intercept traffic between the client browser and Web application. For example, if an application's password-reset logic isn't written properly, you could use BurpSuite to intercept and alter the parameters in an attempt to change another user's password.

We'll have other utilities, of course, as well as a tool to run static code analysis. That tool will eventually be incorporated into our software development life cycle and will be employed to assess the sanity of our source code.

We need our engineers to use all these tools properly, and I want them to learn to think like a hacker. To help, I'll find a trusted third party to provide training and guidance in application assessments and penetration testing. Slowly but surely, all of this will get all of our engineers to thinking about security early and often in the development process. ◆

This week's journal is written by a real security manager, **"Mathias Thurman,"** *whose name and employer have been disguised for obvious reasons. Contact him at mathias_thurman@yahoo.com.*

> **"The lab will be segmented into several virtual LANs, with firewalls to protect them.**

OPINION

PRESTON GRALLA

iPad vs. PC: Sometimes the Accepted Wisdom Is Right

Just because PC makers are innovating doesn't mean people will buy the new hardware.

WILL INNOVATIVE PCs put an end to the iPad era?

It has become accepted wisdom among IT professionals and industry observers that tablets have eaten heavily into PC sales and will continue to do so, bringing the PC era to a close.

Of course, there is always a naysayer, and at least one analyst is challenging the accepted wisdom. Citibank's Glen Yeung argues that PCs will reclaim the innovation crown from Apple's iPad. In a recent research note to clients, Yeung says that Apple's plans for upgrading the next generation of iPads calls for only the basics: an improved screen, a smaller and lighter footprint and a new processor. His conclusion: "iPad innovation of this nature is insufficient to reverse share loss."

For him, true innovation will come in the Windows world, where a new generation of "touch-based, ultrathin, all-day notebooks at improving price points" is poised to turn people back to the possibilities of a PC.

Intel's new Haswell chip will make this possible, Yeung says. I won't get into all the nitty-gritty specs of the Haswell chip. But here's what's important: The chip, expected to be launched in June, is designed to deliver high performance with very low power consumption. In addition, Yeung claims that Intel will require all Haswell-based ultrabooks to be touch-enabled, adding that the company "envisions price points as low as $599."

But the Haswell chip isn't just for ultrabooks. You can also expect Windows 8 tablets, as well as hybrid devices — thin, light machines that do dual duty as notebooks and tablets. It's become a truism that tablets are for consuming content and notebooks for creating it. These hybrids will be able to change form and do both.

There's some evidence that Yeung might be on to something. A recent Forrester report, "2013 Mobile Workforce Adoption Trends," found that for their next tablet, information workers favor Windows over the iPad, with 32% saying they want a Windows tablet, 26% opting for an Apple tablet, and 12% choosing an Android device. In total, the report claims, 200 million information workers prefer Windows tablets over competing devices.

It's also clear that hardware makers are experimenting far more with Windows devices than Apple is with the iPad. With Apple's current plans, the iPad you're using today is largely the same as the next iPad you'll buy, except the new one will be faster and lighter and will have a better screen. Windows 8, though, has led to an explosion in the number of form factors and ways to interact with the operating system. Notable new options include touch-enabled ultrabooks and a variety of tablet-ultrabook combos. There's even talk of a Windows "phablet," a Windows Phone crossed with a Windows tablet.

That all bodes well for Windows. But I'm not yet convinced that Yeung is right. Sales of Windows 8 devices remain sluggish, and iPad sales show no sign of slowing down. Moreover, a Gartner report says that the popularity of iPads and iPhones is forcing enterprises to support Macs as well as PCs, and that Macs will be as commonly accepted in enterprises as PCs by 2014.

In the hardware world, there is no "build it and they will come" imperative. Just because PC makers are innovating doesn't mean people will buy the new hardware. So until I see PC and Windows tablet sales leap and iPad sales stagnate, I won't be a believer in Yeung's theory. ◆

Preston Gralla is a *Computerworld.com* contributing editor and the author of more than 35 books, including *How the Internet Works* (Que, 2006).

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Source: *Harvey Ad Measurement Study, Computerworld May 10, 2010

Career Watch

ASK A PREMIER 100 IT LEADER

Michael Capone

The CIO at ADP answers questions on **managing vs. leading,** *and more.*

How does a good manager become a leader? Managing and leading have virtually nothing to do with one another. Managing implies supervision and providing direction, both which are of course necessary activities in any organization. Leading is all about creating a vision that is so compelling that people will follow you even if you don't wield any formal authority. We assume that it's a natural progression for managers to become leaders, but this is often not the case. Many of the most extraordinary acts of leadership I have witnessed have come from people who had no management responsibility whatsoever.

I'm thinking about pursuing an MBA. What should I study? Finance. Strong financial skills are always valuable in business and are a great compliment to technical knowledge.

What major issues should IT departments plan to address in the coming year? Year after year, the answer to this question never changes for me. There is only one issue that IT departments should be addressing: Is IT able to make a material contribution to the advancement of your organization's business strategy? Confronting this issue may lead to some interesting decisions around analytics, the cloud and other areas.

If you have a question for one of our Premier 100 IT Leaders, send it to **askaleader@computerworld.com,** and watch for this column each month.

Linux: It's Good to Be King

Linux professionals are in demand, with 75% of them saying they have been contacted by a recruiter in the past six months. That's one of the findings from a survey conducted by the Linux Foundation and tech career site Dice.com. If you need Linux talent, you'll have a hard time finding it, the survey found, and if you have it, you'll have a hard time holding on to it: Over a third of the responding Linux pros said they plan to switch employers within the next year. More often than not, they'll be looking for more money when they do so.

Top 3 Incentives Driving Linux Pros to New Jobs

More money	**74%**
Better work/life balance	**61%**
Flexible work schedule/telecommuting	**47%**

It's worth noting, however, that in a separate survey, Randstad Technologies found that 33% of *all* tech workers will probably look for a new job over the next year.

Other results of the Linux Foundation/Dice survey:

9%

Average increase in pay for tech workers with Linux experience from January 2012 to January 2013.

93%

Percentage of employers who plan to hire at least one Linux professional within the next six months.

90%

Percentage of employers who say it's difficult to find Linux professionals.

SOURCE: A LINUX FOUNDATION/DICE.COM JANUARY 2013 SURVEY OF MORE THAN 850 HIRING MANAGERS AT CORPORATIONS, SMALL AND MIDSIZE BUSINESSES, GOVERNMENT AGENCIES AND STAFFING FIRMS, 79% OF WHICH ARE BASED IN NORTH AMERICA, AND OF MORE THAN 2,600 LINUX PROFESSIONALS

Résumés: Suspicious Minds

Here's a challenge for job seekers: You need to find a way to overcome a good deal of suspicion about your résumé's veracity. This is what a recent survey found on this topic:

	IT leaders	IT professionals
I believe most IT résumés contain outright lies.	**35%**	**39%**
I believe most IT résumés exaggerate experience.	**77%**	**63%**

SOURCE: TEKSYSTEMS SURVEY OF OVER 2,000 IT PROFESSIONALS AND OVER 1,500 IT LEADERS, JANUARY 2013

IT Corp., Aliso Viejo (Orange County) CA. has multiple openings at various levels for the position of a Systems Analyst – General; Java; Microsoft and Mainframe. Will collect, review, analyze & recommend technology & Tools; Use independent judgment & discretion to analyze computer systems capabilities. Knowledge & hands on exp. of Software Development life cycle. Exp. in Global Delivery Model. Excellent communication skills, able to communicate complex technical concepts to all levels. Excellent analytical and problem solving skills. Travel to unanticipated client sites throughout the U.S. required. Bachelor's Degree with 2 yrs. of exp.. Mail resume & position desired to Job Number 004RAUST – Attn: Coleen Ryan – UST Global Inc. 20 Enterprise 4th Floor, Aliso Viejo, CA 92656

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Interested candidates send resume to: Google Inc., PO Box 26184 San Francisco, CA 94126 attn: Keeshia Moultrie. Please reference job # below:

Software Engineer Position (Kirkland, WA): **#1615.1552**; Design, develop, modify, and/or test sw needed for various Internet search engine co. projects. Exp. Inc.: write backend sw; distrib syst algorithms; distrib fault-tolerant designs; data struct, algorithms, & perf analysis of large scale distrib syst; debug large scale distrib syst; C++, Java, or Python; write codes; ntwrkng, incl TCP, UDP, IP, RTP or RTSP.

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MA7046 - Software Developer

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Submit resume to Research in Motion Corporation (US), to P.O. Box 141394, Irving, TX, 75014-1394 U.S.A., referencing appropriate job title and requisition number.

Interested candidates send resume to: Google Inc., PO Box 26184 San Francisco, CA 94126 attn: Keeshia Moultrie. Please reference job # below:

Business Systems Integrator (Mountain View, CA) **#1615.3230** Design analytical solutions that provide data to answer complex business decisions. Exp incl: PL/SQL; Unix; TCP/IP; Avaya PBX, CMS, & IVR; VoIP; data analysis; database admin; ntwrk admin; & design, plan, implement, & support of traditional & IP-based call center solutions, incl CTI, IVR, & reporting.

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#1615.4066; Program in an oo lang; algorithms; natural lang process; stat modeling; & AI.

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Interested candidates send resume to: Google Inc., PO Box 26184 San Francisco, CA 94126 attn: Lisa Harrington. Please reference job # below:

Business Systems Integrator (New York, NY) **#1615.3922** Design analytical solutions that answer complex business decisions. Exp incl: Java; web svcs; Jscript; XML; CSS; Regular Expressions; algorithms; creation of pltfrm components; dvlpmnt of sw syst; & design & implement of desktop & web appl & oo sw.

SW Eng Position (NY, NY): Design, develop, modify, and/or test sw needed for various Google projects. Exp. incl:

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#1615.3852 Java or Jscript; web dvlpmnt, incl HTML, CSS, & Jscript; cross browser dvlopmnt, test, profiling,& debug; serve & consume REST-based web svcs; design, implement, test, & maint of modular sw components; modify source code;& identify & refactor suboptimal components & commun of changes to key stakeholders.

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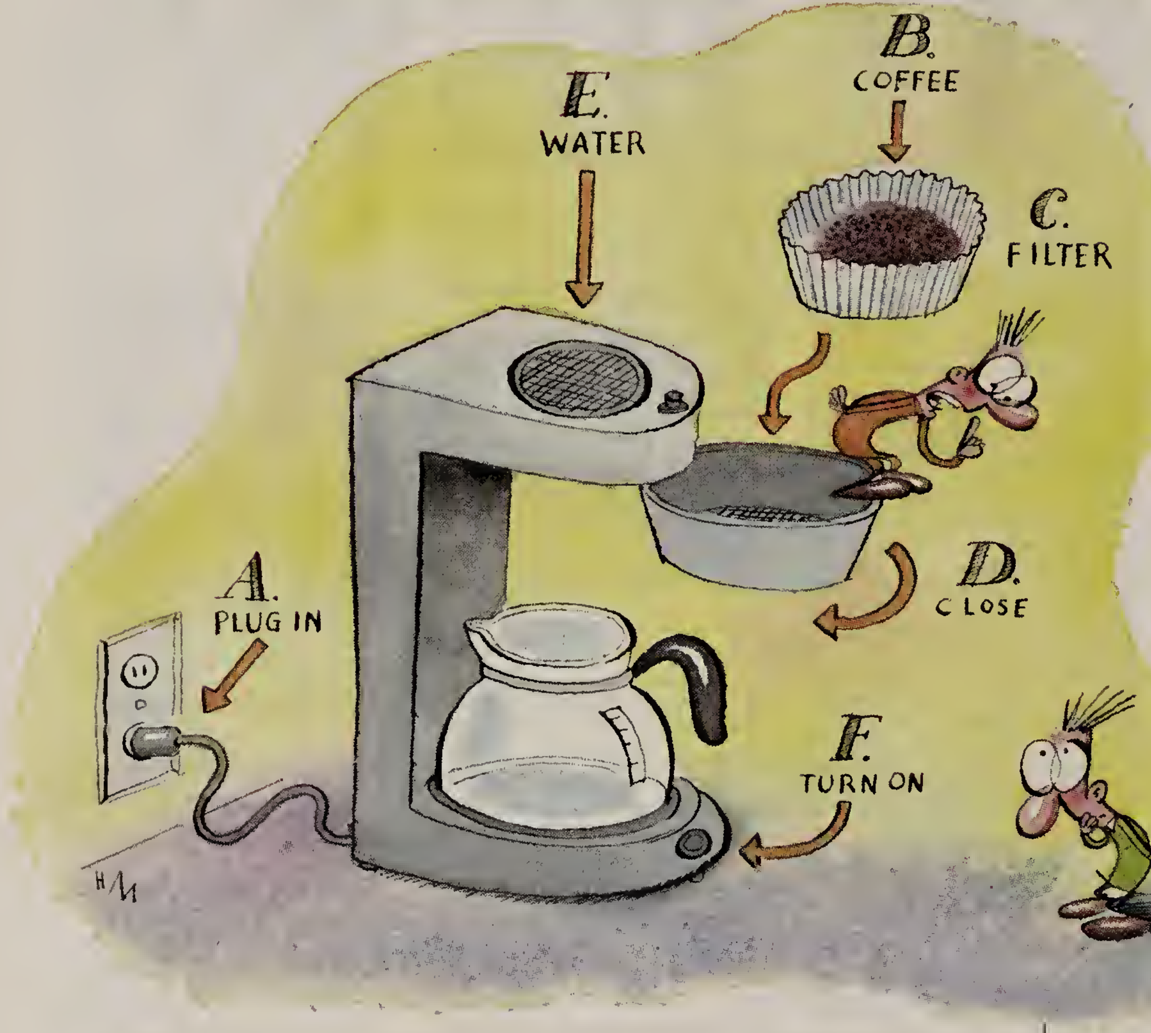

HAL MAYFORTH

Didn't You Take Programming 101?

New hire is a fresh graduate of a major university, so pilot fish is surprised he needs help with the coffee maker. "I push the button but nothing happens." Fish sees there's no water in the machine – nor coffee. Just make a fresh pot, he says. New hire: "How do you do that?" Fish decides a brand-new employee wouldn't be pulling his leg, so he walks him through the process. You put the coffee in the top and pour some water in, then press the brew button, he explains. New hire has some trouble finding the coffee (it's in a bag right next to the coffee maker, labeled "coffee"), then prepares to pour the whole bag into the machine. Fish introduces the concepts of coffee filters and measuring. And seeing that this guy has truly never made a pot of coffee before, he goes ahead and explains how you avoid overflow by filling the pot with water as a guide. New hire does that, then puts the pot of water back on the coffee maker and presses start. Nothing happens. Fish explains that he has to pour the water into the receptacle at the back and put the empty pot in the holder. Once everything is in place, new hire presses start again, then immediately asks, "Where's the coffee?" You have to give it a few minutes to brew, fish says. "By the way, how is it you went through college and never learned how to make coffee?" The answer: 'There was always a Starbucks nearby. Coffee comes from Starbucks."

Not Playing His Song

User calls this pilot fish in a panic: He dialed in to a webconference, but he can't hear the music that always played while he waited in the past. That was true, fish reports, but then "I took a look at the invitation and found that the user was the host. And because he was logged in, the meeting had begun, so no music was going to play."

Off the Hook

At the small college where this pilot fish is IT director, the topic of students' lost emails comes up at a staff meeting. "Before I could say anything, a midlevel, non-tech manager decided to educate everyone on how email can get lost," says fish. "Emails travel on the Internet via 'hooks,' she said. In the nicest way possible, I tried to correct her. She cut me off, said I was wrong, and continued, explaining how emails can sometimes fall off the hooks and can never be recovered. There was no way for me to say anything without bursting out laughing. So I left it at that."

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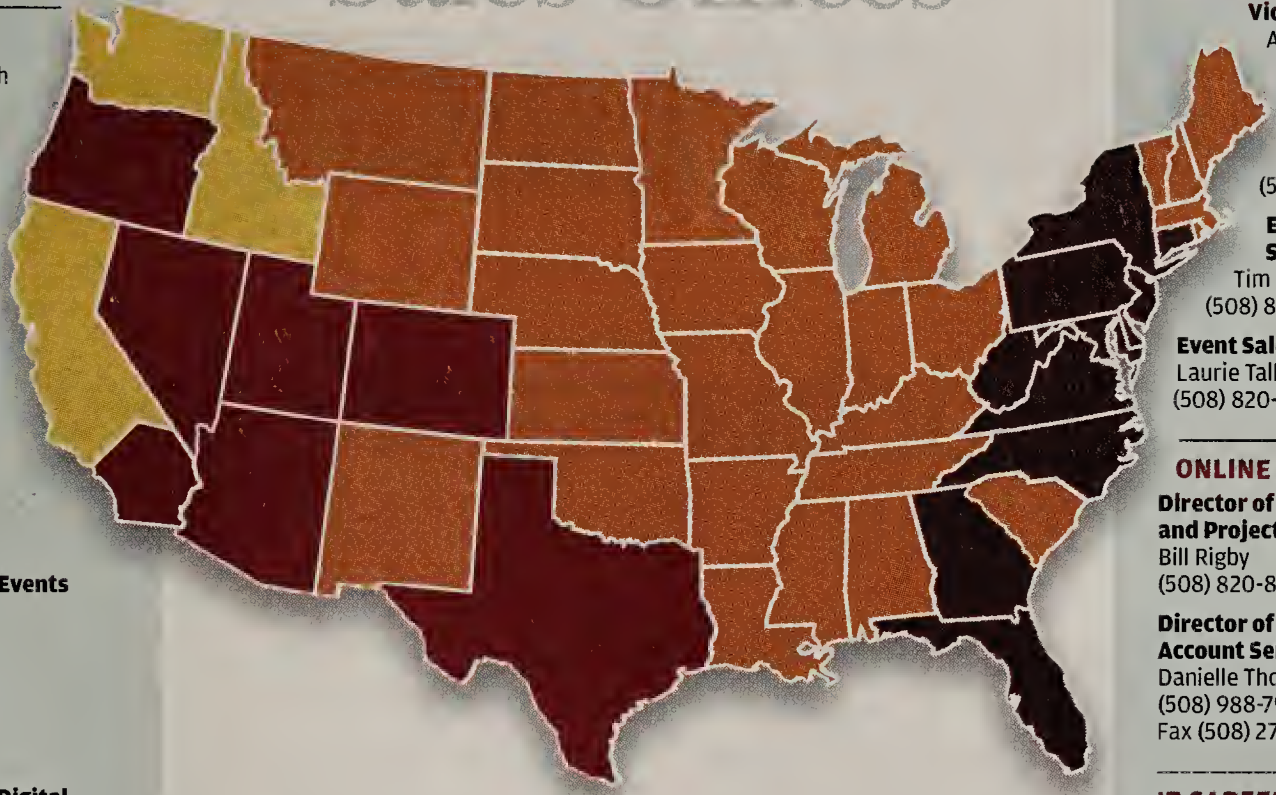

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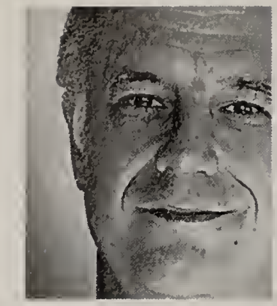

BART PERKINS

Cloudbursts Ahead

Organizations that depend on cloud services need to manage four areas.

MOVING TO the cloud may reduce infrastructure costs and headaches, but clouds have their shortcomings. When they rain, millions can quickly become drenched. In the past year, Amazon, Microsoft, Google and other providers experienced problems, from minor disruptions to major outages. A June 2012 headline captured the fallout: "Modern life halted as Netflix, Pinterest, Instagram go down."

The service interruptions experienced by those companies and others disappointed countless consumers, but it was worse than a disappointment for the businesses themselves. They had come to depend heavily on cloud reliability; when the cloud services they had put their trust in failed, it was as if they had ceased to exist. All the outages were temporary, of course, but revenues were lost during the downtime, and afterwards customers wrote blog posts expressing everything from disappointment to anger, with some proclaiming that they would take their business elsewhere.

Organizations that depend on cloud services need to manage four areas to help ensure that their dependence isn't a liability:

- **Providers.** Ideally, a cloud provider should be managed, monitored and measured like other critical IT suppliers. It is naive to take an "out of sight, out of mind" approach with cloud providers. Begin by setting clear performance goals with well-defined metrics. Assign staff to monitor performance and manage the supplier relationship.
- **Resiliency.** All cloud providers suffer periodic service degradation and occasional full outages. Unfortunately, restoration of normal service may not be fast enough to meet your business needs. On its blog, Netflix says, "It is still early days for cloud innovation, and there is certainly more to do in terms of building resiliency in the cloud." The blog describes the steps Netflix is taking to improve resiliency within Amazon's cloud.

Your enterprise architecture must also be designed for resiliency. Typical approaches involve spreading business functions, data and other assets across the cloud world. Most enterprises separate entities geographically within a single provider's cloud. The truly paranoid may want to spread their assets across multiple cloud providers.

- **Executive expectations.** IT professionals tend to be realistic about the reliability that is possible in the cloud, but a lot of executives on the business side expect well-known cloud providers to offer flawless service. They want "dial-tone" reliability, like the service provided by the old Bell system. But that's a standard that cloud suppliers can't meet now and are unlikely to fulfill anytime soon. (And even Ma Bell experienced occasional service problems.) And even if cloud vendors do one day offer dial-tone reliability, it would likely carry a premium price tag and would be cost-effective only for high-end products.
- **Customer relations.** Customers may become angry when their favorite services or phone apps are slow or temporarily unavailable. Your customer service staff's response must be sympathetic, informative and timely. When outages occur or service levels are significantly hampered, acknowledge the issue, apologize profusely, post status updates regularly, and share preventative measures as they are developed.

While the cloud offers a valuable alternative to extensive and expensive infrastructure, it's not yet perfect. When IT comes under attack for flawed cloud service, remind executives what prompted the move to the cloud: the difference between costs incurred with a cloud provider and those required to build and operate an enterprise infrastructure. Most good bargains require some level of trade-off, and clouds are no exception. ◆

Bart Perkins is managing partner at Louisville, Ky.-based Leverage Partners, which helps organizations invest well in IT. Contact him at BartPerkins@LeveragePartners.com.

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